PATENT ABSTRACTS OF JAPAN

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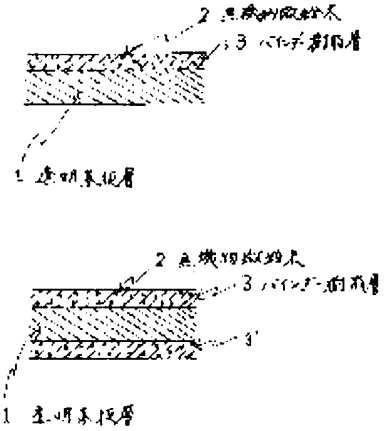
(54) REFLECTION PREVENTING LAMINATE

(57)Abstract:

PURPOSE: To lower a haze value in spite of good reflection preventing capacity and to reduce the shading-off of the circumferential part of a cathode ray tube even in the state superposed to said tube, by providing a binder resin layer containing a specific inorg. fine powder to a transparent substrate layer and specifying the surface unevenness thereof.



CONSTITUTION: A binder resin layer 3 and/or 3' containing an inorg. fine powder 2 having an average particle size of 0.1W4μm is provided to the single surface or both surfaces of a transparent substrate layer 1. This reflection preventing laminate is prepared by applying a binder resin solution containing the inorg. fine powder to the transparent substrate layer to dry the same. The surface unevenness of the reflection preventing laminate is 0.05W10μm in ten-point average roughness RZ due to JIS and the number of the uneven parts thereof are 200W1,000 per area of 0.01mm2. As the transparent substrate, there are glass, an acrylic resin or the like and, in an uncolored case, one having visual light transmissivity of about 80% or more is pref. The binder resin is selected from transparent ones having adhesive strength to the substrate layer. When the substrate layer is composed of polyethylene terephthalate, a ketone resin is added to alkyl etherified melamine if necessary. As a silica fine powder, one having an average primary particle size of about 5W100μm is pref.

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審査請求　未請求　発明の数 1　（全5頁）

⑭発明の名称　反射防止用積層体

⑳特　願　昭62－112091
㉒出　願　昭62(1987)5月8日

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明　細　書

1．発明の名称　反射防止用積層体

2．特許請求の範囲

(1)透明基板層の片面又は両面に平均粒子径0．1～4μmの無機物微粉末を含有したバインダ樹脂層を設けたことを特徴とする反射防止用積層体

(2)その表面の凹凸が、JIS規格、B－0601の十点平均粗さRzで0．05μm～10μmで、且つその凹凸が面積0．01㎟中に200～1000個を有する特許請求の範囲第1項記載の反射防止用積層体

3．発明の詳細な説明

（産業上の利用分野）

本発明は表示装置の表面正反射光等の表面グレアを防止し、且つ可視光線透過率の低下を極めて少なくして表示画面を見易くした反射防止用積層体に関する。

反射防止用積層体とは、例えばテレビのブラウン管、発光ダイオード表示板、液晶表示板、プラズマ表示板、時計、各種表示機器類の表示板等の様に光学的な発光装置又は機器の前面に装着するものである。

（従来技術および問題点）

従来、発光表示表面のグレアを防止するために、表面をつや消し状にし、正反射防止したガラスやプラスチックの前面板が広く用いられている。例えば、前者はガラス表面をエッチングなどの化学的方法或いはサンドブラスト等の機械的方法により凹凸状に加工したもの等である。後者は、つや消しマット状に加工したガラス板や金型を用いてプラスチックをフィルム状に形成し凹凸を転写させたもの又は既存のつや消しクリアー塗料をプラスチックフィルムに塗装したもの等である。しかし、前者の場合、表面グレア防止性は満足しても表示画面の解像度の低下が大きいという欠点がある。また、後者に於いても転写による成型品は表面グレア防止性と解像度のバランスが、一方の特性を向上させれば他の一方の特性が低下するため、必ずしも充分でなく、又既存のつや消しクリアー塗料を塗装したものについても表面グレア防止性

と解像度のバランスは満足できるものではない。プラスチックのフィルム上につや消しクリヤー塗料を塗装し、反射防止用積層体を得る例としては例えば、特開昭60-92850がある。この方法は本発明と基本的には同様な考え方であるが、シリカ微粉末のクリヤー液への混入後の分散法がスターラーの様な方法のため、一旦分散したシリカ微粉末がクリヤー液中で再凝集してしまい、塗装後のフィルム表面に凝集したシリカ微粉末が不均一に塗装されるため、反射防止用積層体としては、表面光沢度がまだまだ高い一方、分散の不均一さのために解像度の低下につながり問題があった。

一般に反射防止用積層体としての特性は、おおよそ透過率40%以上、60度表面光沢度（JIS規格Z8741）70%以下、ヘーズ25%以下をすべて満足されなければならない。

又反射防止用積層体それ自体の単純な反射防止性能のみの問題ではなく、例えばテレビのブラウン管の如く曲面の表示装置に平板の反射防止用積

層体を重ねて使用する場合は両者の距離の小さい中央部と距離の大きい周囲部とで表示のボケ度合が異なり反射防止用積層体自体の反射防止性能の大きい物程その差が大きくなる傾向がある。本発明はかかる欠点を持たず反射防止性能が良いにも拘らずヘイズ値が小さくテレビのブラウン管の如き曲面表示装置に重ねても周囲部のボケが少ない反射防止用積層体を開発したものである。

（問題点を解決するための手段）

上記の目的を達成するため、本発明は次の構成からなる。

即ち第1図（a）、（b）に示した如く透明基板層1の片面又は両面に平均粒子径0.1～4μmの無機物微粉末2を含有したバインダ樹脂層3及び／又は3′を設けた反射防止用積層体である。

平均粒子径0.1～4μmの無機物微粉末を含有したバインダ樹脂層とは透明基板層上に設けられた状態での無機物微粉末の平均粒子径を意味し、一般的には無機物微粉末を含有したバインダ樹脂液を透明基板層上に塗布乾燥して作られるが、そ

の液中での無機物微粉末の平均粒子径を意味するものでは無い。

かかる本発明の反射防止用積層体を性能的に表現するとその表面の凹凸が、JIS規格、B-0601の十点平均粗さRzで0.05μm～10μmで、かつその凹凸が面積0.01mm^{2}中に200～1000個を有する反射防止用積層体ということになる。

透明基板としては、特に限定はないが、ガラス、アクリル、PET、ポリカ・ボネート、エポキシ、ポリエーテルサルホン、ポリアリレートなどであり、無着色の場合、可視光線透過率が80%以上程度のものが好ましい。着色積層体の基材とする場合は染色した透明基板を用いても良い。又、透明基板の厚さは、積層体の用途に応じて、任意であって良い。バインダー樹脂は基板層と接着力を有する透明なものを選ぶ。基板層がポリエチレンテレフタレートの場合例えば特開昭60-92850に記載されているアルキルエーテル化メラミン、ブチラール樹脂、酸性リン酸アルキルエステ

ルに必要に応じてケトン樹脂を加えたものが良い。

微粉末としてはシリカを使用するのが好ましい。シリカ微粉末としては、平均一次粒子径が通常約5～100mμ程度、好ましくは20～50mμのものを使用する。平均粒子径が5mμ未満では塗料がつや消しとならず、表面グレア防止性が不充分となり、又100mμを越えると均一な塗膜が得られ難く、透明性が低下するので好ましくない。その使用量はバインダー樹脂100重量部に対して2～30重量部程度好ましくは3～10重量部である。2重量部より少ないと表面グレア防止性が不充分となり、又30重量部より多いと透明性が落ちヘーズが増加して解像度が不充分になるので好ましくない。

積層体を着色する場合には天然若しくは合成の有機及び無機染料を使用しても良い。又、通常塗料に添加される体質顔料、分散剤、消泡剤、沈殿防止剤、帯電防止剤、レベリング剤等の様な各種の補助添加成分を含有することができる。本発明におけるつや消しクリアー塗料は、通常各種溶剤

を加えて、粘度、固形分濃度等を調整して使用される。溶剤の種類は特に制約は無いが溶剤の蒸発速度が大きすぎると塗膜が発泡したり、しわが発生したりするので、沸点60℃位から沸点250℃位までの範囲の種々の沸点を有する溶剤を2種以上混合することにより、蒸発速度をコントロールするのが好ましい。溶剤中の本発明におけるつや消しクリアー塗料の濃度は、必要に応じてかなり広汎にわたり変更でき、通常濃度0．1～50重量%位の範囲で選択される。本発明の反射防止用積層体は、塗料中にシリカ微粉末を均一に分散性よく分散させ透明基板に上記つや消しクリヤー塗料を塗装し乾燥硬化することにより得られる。分散法としては、スターラーなどは分散能力が弱いため適当でなく強力に分散できる方法を用いる。例えば、サンドミル、ボールミル、振動ミル、アトライター、ホモミキサーサンドミル、三本ロールミルなどが好ましい。塗装方法としては、例えば刷毛塗り、ロール塗装、スピン塗装、流し塗り、スプレー塗装、ロール塗装、カーテンフロー塗装

等の通常の方法を用いることができる。塗膜の乾燥条件は、溶剤の相成、塗膜の厚さ等によってもその最適条件が異るが、通常90～170℃程度の温度で乾燥出来るものを選ぶのが良い。乾燥時間は、通常90～170℃で30秒以上とするのが適当である。

本発明の反射防止用積層体における塗膜の厚さは、通常1～20μm程度、好ましくは1～10μmとするのが良い。1μm未満では表面保護機能が充分でなく、又20μmを越えると積層体の透過率が低下する傾向があるので好ましくない。

本発明積層体は無色は勿論のこと、必要に応じて着色して使用することができる。

（発明の効果）

本発明の反射防止用積層体は例えば第2図にモデル的に示した如く、粒子径、濃度をかえて従来法で作った物のヘーズと表面光沢度との関係（曲線A）に対して、本発明品の場合のヘーズと表面光沢度との関係（曲線B）とを比較すると従来の様に無機物微粉末の平均粒子径の比較的大きい物

を用いた場合よりも同じ表面光沢度の物でも、ヘーズが小さい。従って長時間画面を見ていても、目の疲労が極めて少ない。従って、例えばコンピューターのディスプレーのように近距離から画面を見る場合において、外部からの光の正反射を防止するため画面が見易く、しかも長時間見ていても眼の疲労を防止する等の効果が発揮されるのでコンピューター、各種計測器、医療機器等の表示用に極めて有用である。　以下、実施例と比較例を挙げて本発明を更に具体的に説明する。

実施例1

ブチルエーテル化メラミンとして「スーパーベッカミンJ－820－60」（大日本インキ化学工業（株）製）30重量部（固形分換算）ブチラール樹脂として「エスレックBL－1」（積水化学工業（株）製）10重量部、酸性リン酸イソプロピル4重量部、平均一次粒子径40mμのシリカ微粉末6重量部及び硬化触媒としてリン酸2重量部をエチルセロソルブ40重量部トルエン80重量部、メチルエチルケトン80重量部からなる混合

溶剤に加えて、サンドミルで40分間分散させ、つや消しクリヤー塗料を得た。これを厚さ125μm、可視光線透過率84%の2軸延伸ポリエチレンテレフタレートフィルムにスピン塗装し、130℃の熱風乾燥器中で30分間乾燥させて、上記フイルム層と塗膜硬化層からなる本発明反射防止用積層体を得た。

この積層体中のシリカ微粉末の平均粒子径を電子顕微鏡で測定したところ0．8μmであった。

結果を表1に示す。尚、全光線透過率、平行光線透過率、拡散光線透過率、及びヘーズは、スガ試験機（株）製、ヘーズメーターHGM－20型を用いて測定した。。

又、表面光沢度については、村上色彩技術研究所、グロスメーターGM－3型を用いて60度角で測定した。塗膜の密着強度は、一般に行なわれているセロテープ剥離テストを行なったが異常はなく、スチールウールでこすってもキズがつかず、耐擦傷性にも優れていた。

本実施例で得られた物を後記する比較例1又は

比較例２と比べると、実施例１の方が光線透過率が高く、且つヘーズ及び表面光沢度が低いことにより、表面グレア防止性及び解像度のいずれにも優れていることが判る。また電子顕微鏡写真から実施例１の表面はシリカが微細にかつ均一に塗工されているのに対し、比較例１では、表面がほとんど平滑で、比較例２ではところどころに凝集したシリカが塗工されている状態であることがわかった。

実施例２

実施例１に於てシリカ微粉末を８重量部使用した以外は同様にし結果を第１表に合せて示した。

この積層体中のシリカ微粉末の平均粒子径を電子顕微鏡で測定したところ１．０μｍであった。

比較例１

シリカ微粉末を１重量部用いる以外は実施例１と同じにした。結果を第１表に合せて示した。

このものは解像度がかなり良かったが、表面がほとんど平滑のため、表面光沢度高すぎ、まったく反射防止効果がなかった。

比較例２

分散法をスターラーで一日攪拌する事に変えた以外は実施例１と同様にした。結果を第１表に合せて示した。

比較例３

分散法をスターラーで一日攪拌する事に変えた以外は実施例２と同様にした。結果を第１表に合せて示した。

４．図面の簡単な説明

第１図は本発明積層体の断面略示図、

第２図は表面光沢度とヘーズとの関係の説明図である。

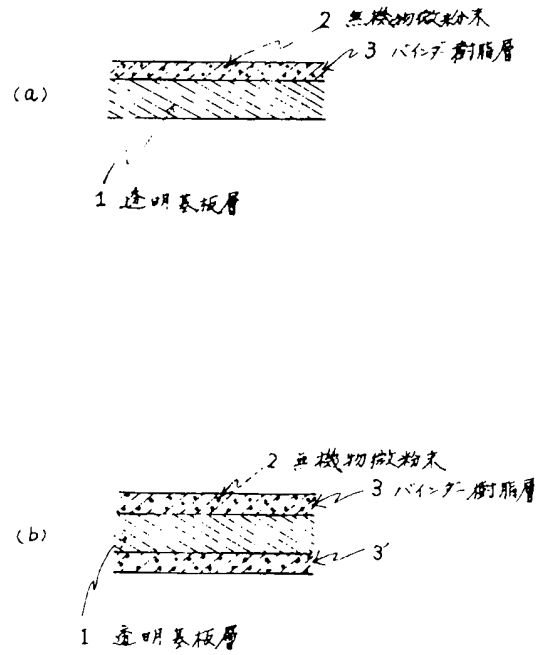
１　透明基板層
２　無機物微粉末
３　バインダー樹脂層

第１表

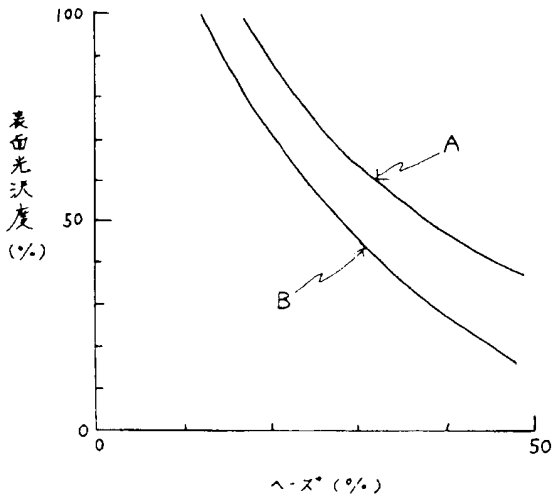
	実施例１	実施例２	比較例１	比較例２	比較例３
凸凹数(0.01 mm^2)	612	795	12	107	140
十点平均粗さ(mμ)	0.35	0.46	0.10	13.1	15.2
完成積層体中の平均粒子径(μm)	0.8	1.0	0.2	15.1	17.6
全光線透過率(%)	85.2	85.3	85.6	78.0	75.1
平行光線透過率(%)	65.6	55.3	81.2	42.1	30.4
拡散光線透過率(%)	19.6	30.0	4.1	35.9	45.1
ヘーズ (%)	23.1	32.8	5.1	46.0	60.0
表面光沢度 (%)	61.0	51.2	120.1	36.0	13.5

特許出願人
ダイセル化学工業株式会社

第１図



第 2 図



PTO 01-3327

Japanese Kokai Patent Application
No. Sho 63[1988]-276540

ANTIREFLECTIVE LAMINATE

Tadashi Murakami

UNITED STATES PATENT AND TRADEMARK OFFICE
WASHINGTON, D.C. JULY 2001
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ANTIREFLECTIVE LAMINATE

[Hanshaboshi yo sekisotai]

Inventor:	Tadashi Murakami
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[There are no amendments to this patent.]

Claims

1. An antireflective laminate characterized by the fact that a binder resin layer containing the fine powder of an inorganic compound with an average particle size in the range of 0.1-4 μm is formed on one or both sides of a transparent substrate layer.

2. The antireflective laminate described in Claim 1 characterized by the fact that the embossing on surface is in the range of 0.05-10 μm measured in ten-point average roughness Rz as specified in JIS B-0601, and the number of the embossing is in the range of 200-1000 in an area of 0.01 mm^2.

Detailed explanation of the invention

Industrial application field

The present invention pertains to an antireflective laminate that prevents the normal reflection light or other surface glare from the surface of a display device and causes hardly any decrease in the visible light transmissivity, thus making it easy to view the displayed images.

The antireflective laminate is mounted on the front surface of the cathode ray tube of a TV, light-emitting diode display panel, liquid crystal display panel, plasma display panel, watch, display panels of various types of display devices, and other optical light-emitting devices or equipment.

Prior art and problems to be solved by the invention

Conventionally, front surface plates made of glass or a plastic material with delustered surfaces to prevent glare from a light-emitting display surface have been widely used to prevent normal reflection. A glass surface can be embossed by etching or another chemical method or by

sandblasting or another mechanical method. It is also possible to use a delustered glass plate or die to process a plastic material into a film and transfer the embossing to the film or to coat an existing clear delustering coating material on a plastic film. Although satisfactory surface glare preventability can be realized in the first case, however, the resolution of the displayed image becomes low. This is a serious problem. In the second case, the balance between prevention of surface glare and effect on resolution of the molded product with transferred embossing is not necessarily satisfactory, because one of these characteristics will deteriorate if the other characteristic improves. The balance between the surface glare preventability and the resolution cannot be satisfied even for the product coated with an existing clear delustering coating material. Japanese Kokai Patent Application No. Sho 60[1985]-92850 disclosed an example of an antireflective laminate obtained by coating a clear delustering coating material. This method is basically identical to the present invention. However, since a stirrer is usually used to mix fine silica powder into a clear solution, the fine silica powder that has been dispersed will coagulate again in the clear solution. The coagulated fine silica powder coats the film surface unevenly. As a result, while the surface gloss is still high, the dispersion becomes uneven, degrading the resolution.

Generally, an antireflective laminate must satisfy all following characteristics: transmissivity of 40% or higher, a 60° surface gloss (according to JIS Z8741 standard) of 70% or lower, and a haze of 25% or lower.

The antireflective property of an antireflective laminate is not the only problem. For example, when a flat antireflective laminate plate is overlapped with a curved surface, such as the cathode ray tube of a TV, the degree of blur in the central part of the display where the distance between the laminate and the curved surface is small and in the peripheral part where

the distance between the laminate and the curved surface is greater. This difference tends to become significant as the antireflective property of the antireflective laminate itself becomes high. The purpose of the present invention is to solve the aforementioned problems by providing an antireflective laminate that has good antireflective property, small haze value, and little blur in the peripheral part even when it is overlapped with a curved surface, such as the cathode ray tube of a TV.

Means to solve the problems

To realize the aforementioned purpose, the present invention provides an antireflective laminate with the following configuration:

The antireflective laminate is characterized by a binder resin layer (3) and/or (3') containing the fine powder of an inorganic compound (2) with an average particle size in the range of 0.1-4 μm is formed on one or both sides of a transparent substrate layer, as shown in Figures 1(a) and 1(b).

The binder resin layer containing the fine powder of an inorganic compound with an average particle size in the range of 0.1-4 μm refers to the average particle size of the fine inorganic compound powder when the binder resin layer is formed on the transparent substrate layer. Although the binder resin layer is usually formed by coating and drying a binder resin solution containing the inorganic compound powder on the transparent substrate layer, the aforementioned average particle size does not refer to the average particle size of the inorganic compound powder in the solution.

To specify the antireflective laminate of the present invention in a functional manner, the embossing on its surface is in the range of 0.05-10 μm measured in ten-point average roughness

Rz as specified in JIS B-0601, and the number of the embossings is in the range of 200-1000 per 0.01 mm^2.

There is no special limitation on the transparent substrate, which can be made of glass, acryl, PET, polycarbonate, epoxy, polyethersulfone, polyacrylate, etc. It is preferred that a material be used with a visible light transmissivity of 80% or higher if the laminate is not colored. It is also possible to use a colored transparent substrate as the base material of a colored laminate. The thickness of the laminate can be set at will in accordance with the application of the laminate. A transparent binder resin is selected that is adhesive to the substrate layer. If the substrate layer is made of a polyethylene terephthlate, it is possible to use a material prepared by adding a ketone resin to alkyl etherified melamine, butyral resin, or acidic alkyl phosphate as described in Japanese Kokai Patent Application No. Sho 60[1985]-92850, if necessary.

It is preferred that silica be used as the fine powder. The average particle size of the fine silica powder used should be in the range of 20-50 μm, or preferably in the range of 20-50 μm. If the average particle size is smaller than 5 μm, the coating material will not be delustered, and the surface glare preventability becomes poor. If the average particle size is larger than 10 μm, it is difficult to obtain a uniform coating film, and transparency will deteriorate. The amount of the fine silica powder used should be in the range of 2-30 parts by weight, or preferably in the range of 3-10 parts by weight with respect to 100 parts by weight of the binder resin. Less than 2 parts by weight yields insufficient surface glare prevention. More than 30 parts by weight degrades transparency, and increases haze. As a result, the resolution becomes low.

Natural or synthetic organic and inorganic dyes can be used to color the laminate. The fine silica powder may also contain extender pigments, dispersants, defoaming agents, antiprecipitation agents, antistatic agents, leveling agents, and other various types of additives. In

the present invention, the clear delustering coating material can be used by adding various normal solvents to adjust the viscosity and the solids content. There is no special limitation on the type of solvent used. However, if the evaporation rate of the solvent is too high, the coating film will foam, and wrinkles will occur. Consequently, it is preferred to control the evaporation rate by mixing two or more types of solvents with different boiling points in the range of 60-350°C. The concentration of the clear delustering coating material of the present invention in the solvent can be varied in a wide range as demanded. The concentration is usually in the range of 0.1-50 wt%. The antireflective laminate of the present invention is obtained by homogeneously dispersing fine silica powder in a coating material and coating is clear delustering coating material on a transparent substrate, then curing by drying. It is inappropriate to use a stirrer for dispersion because its dispersion power is low. A method that can powerfully perform dispersion is adopted. Preferred examples include sand mill, ball mill, vibration mill, attrition mill, homomixer, three-roll mill, etc. Examples of the coating method that can be used include brush coating, roll coating, spin coating, flow coating, spray coating, roll coating, curtain flow coating, etc. The optimum drying conditions vary with the type of solvent and the thickness of the coating film, etc. Drying is usually performed at a temperature in the range of 90-170°C. The drying time is usually in the range of 90-170 sec.

The thickness of the coating film in the antireflective laminate of the present invention is usually in the range of 1-20 μm, or preferably in the range of 1-10 μm. If the thickness is smaller than 1 μm, the surface-protecting property is insufficient. If the thickness is greater than 20 μm, the transmissivity of the laminate becomes low.

The laminate of the present invention is colorless. If necessary, it can also be colored.

Effects of the invention

With the particle size and concentration varied, Figure 2 shows the relationship between haze and surface gloss of the antireflective laminate disclosed in the present invention (curve B) in comparison with the relationship between haze and surface gloss of a conventional laminate (curve A). As shown in the figure, for the same surface gloss, the degree of haze is lower than that in the conventional case in which the fine powder of an inorganic compound with a relatively large average particle size is used. Consequently, the eyes will not become fatigued even viewing the screen for a long period of time. When viewing a screen up close, such as a computer monitor display, since the normal reflection of the light coming from the outside can be prevented, the screen is easy to view, and the eyes will not become fatigued even viewing the screen for a long time. Consequently, the present invention is very useful for the computer displays, various types of measurement instruments, medical devices, etc. In the following, the present invention will be explained in more detail with reference to application examples and comparative examples.

Application Example 1

30 parts by weight (in the equivalent of the solid content) "Superbeckermin [transliteration] J-820-60" (product of Dainippon Ink & Chemicals, Inc.) as butyl etherified melamine, 10 parts by weight "Esreck [transliteration] BL-1" (product of Sekisui Chemical Co., Ltd.) as butyral resin, 4 parts by weight acidic isopropyl phosphate, 6 parts by weight fine silica powder with an average particle size of 40 μm, and 2 parts by weight phosphoric acid as curing catalyst were added to a solvent mixture consisting of 40 parts by weight ethyl cellosolve, 80 parts by weight toluene, 80 parts by weight methyl ethyl ketone. The mixture was dispersed in

a sand mill for 40 min, obtaining a clear delustering coating material. The coating material was spin coated on a biaxially stretched polyethylene terephthalate film with a thickness of 125 μm and a visible light transmissivity of 84%. The coated film was dried in a hot air dryer at 130°C for 30 min, obtaining the antireflective laminate of the present invention comprising the aforementioned film layer and cured coating layer.

The average particle size of the fine silica powder in the laminate was 0.8 μm, as measured with an electron microscope.

The results are listed in Table 1. The total light transmissivity, parallel light transmissivity, diffused light transmissivity, and haze were measured using haze meter HGM-20 produced by Suga Shikenki K.K.

The surface gloss was measured at an angle of 60° using glowmeter GM-3 produced by Muragami Color Technology Research Lab. The adhesive strength of the coating film was evaluated by performing a cellotape peeling test. No abnormality occurred, and even if the coating film was scratched with steel wool, no damage was caused, indicating that the coating film had an excellent anti-scratch property.

Compared with Comparative Example 1 or 2 to be described later, the laminate obtained in Application Example 1 has higher light transmissivity and lower haze and surface gloss. Therefore, both the surface glare preventability and resolution are excellent. As can be seen from the electron microscope pictures, the surface of the laminate obtained in Application Example 1 is fine and uniformly coated. On the other hand, in Comparative Example 1, the surface is almost smooth. In Comparative Example 2, the coated silica is coagulated in some areas.

Application Example 2

The laminate was formed in the same way in the same way as described in Application Example 1 except that the amount of the fine silica powder used in Application Example 1 was changed to 8 parts by weight. The results are listed in Table 1.

The average particle size of the fine silica powder in the laminate was 1.0 μm as measured by an electron microscope.

Comparative Example 1

The laminate was formed in the same way as described in Application Example 1, except that the amount of the fine silica powder used in Application Example 1 was changed to 1 part by weight. The results are listed in Table 1.

Although the resolution was good, since the surface was almost smooth, the surface gloss became too high. As a result, there was no antireflective effect.

Comparative Example 2

The laminate was formed in the same way as described in Application Example 1 except that the stirring method adopted was dispersion with a stirrer for one day. The results are listed in Table 1.

Comparative Example 3

The laminate was formed in the same way as described in Application Example 2 except that the stirring method adopted was dispersion with a stirrer for one day. The results are listed in Table 1.

Brief description of the figures

Figure 1 is a schematic cross-sectional view illustrating the laminate of the present invention.

Figure 2 is a diagram explaining the relationship between surface gloss and haze.

1 Transparent substrate layer

2 Fine powder of inorganic compound

3 Binder resin layer

Table 1

Key:
1 Application Example
2 Comparative Example
3 Number of embossing
4 Ten-point average roughness
5 Average particle size in finished laminate
6 Total light transmissivity
7 Parallel light transmissivity
8 Diffused light transmissivity
9 Haze
10 Surface gloss

Figure 1

Key: 1 Transparent substrate layer
2 Fine powder of inorganic compound
3 Binder resin layer

Figure 2

Key: 1 Surface gloss
2 Haze